

## REMARKS

Claims 41, 43, 45 – 49, 68 , 69, 74, and 75 are presently pending in the application. Claims 41, 50, and 68 have been amended. Claims 74 and 75 are new. The amendments to claims 41 and 50 are supported at least by paragraph [0076] and Figure 3 of Applicants' specification and by originally filed claim 44, presently cancelled. New claim 74 is supported at least by paragraph [0076], first sentence. New claim 75 is supported at least by paragraph [0076], last sentence. The amendment to claims 68 and 71 are supported at paragraph [0053], last sentence. Withdrawn claim 50 has been amended for consistency with amended claim 41. Withdrawn claim 71 has been amended for consistency with amended claim 68.

The Examiner has maintained the previous rejections of the Non-final Office Action mailed November 23, 2010. The Examiner was not persuaded by Applicants' arguments in Applicants' response filed March 23, 2011.

Claims 41, 42, and 44-47 stand rejected under 35 U.S.C. § 102(e) as anticipated by or, in the alternative, obvious under 35 U.S.C. § 103(a) over United States Patent publication 2005/0191490 (hereinafter, *Ton-That*) in view of USPN 6,270,897 to Flautt (hereinafter *Flautt*).

Claim 43 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ton-That* in view of Flautt and further in view of Ajayan, *et al.*, "Single-Walled Carbon Nanotube-Polymer Composites: Strength and Weakness", *Adv. Mater.*, 12:2000, pp. 750-753 (hereinafter, *Ajayan*).

Claims 48 and 49 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ton-That* in view of *Flautt* and further in view of United States Patent 3,312,569 (hereinafter, *Philipps*).

Claims 68 and 69 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ton-That* in view of *Flautt* and further in view of Velasco-Santos, *et al.*, "Chemical Functionalization of Carbon Nanotubes Through an Organosilane", *Nanotechnology*, 13:2002, pp. 495-498 (hereinafter, *Velasco-Santos*).

### **Previous remarks**

Applicants hereby reiterate and incorporate by reference Applicants remarks in that Office Action.

### **New remarks**

In the interests of advancing prosecution, Applicants have amended claims 41, 50, and 68 and added new claims 74 and 75. Applicants here address the Examiner's response to Applicants' arguments and the Examiner's summary of the interview occurring August 8, 2011, as well as add additional remarks in response to the continued rejection of claim 68.

#### **I. Covalent bonding**

With respect to the claimed covalent bonding, the Examiner's stated reasons include: "Therefore, it is reasonable for one of ordinary skill in the art to expect that once the prior art combination is formed, the carbon nanotubes will covalently bond to both the fiber reinforcement material and the epoxy resin, as both the glass fibers and the carbon nanotubes are organosilane-functionalized, and functionalizing the carbon nanotubes increases the number of bonding sites to the epoxy resin."

#### **A. Dis-Similar Structure**

In response to the Examiner's phrase "increases the number of bonding sites to the epoxy resin" quoted above, Applicants have amended claim 41 to recite "wherein the fiber reinforcement material is silane-functionalized with the organosilane species". This amendment clarifies that previously amended claim 41 reciting "via the organosilane species" were intended to incorporate the limitation "wherein the fiber reinforcement material is silane-functionalized" of claim 44, which was cancelled in the previous response, along with the limitation that the silane-functionalization is with the organosilane species, referring for organosilane species with which the carbon nanotubes are functionalized. Applicants respectfully assert that while the "organosilane species" limitation is not limited to one organosilane molecule. That is, claim 41 reads on one or

more organosilane molecule linking a carbon nanotube to fiber reinforcement material. Figure 3 of Applicants specification shows one molecule. More than one is encompassed by paragraph [0076] of Applicants specification. Withdrawn claim 50 has been amended for consistency with presently amended claim 41. Applicants note that bonding of organosilane-fucntionalized carbon nanotubes to the epoxy resin contrasts with bonding of organosilane-functionalized carbon nanotubes to fiber reinforcement material. Further, bonding of organosilanc-functionalized fiber reinforcement material to the epoxy resin contrasts with bonding of organosilane-functionalized fiber reinforcement material to carbon nanotubes. For at least this reason, Applicants' amended claim 41 is patentable over Ton-That in view of Flautt.

## **B. Product by process**

In response to the Examiner's phrase "once the prior art combination is formed" quoted above and to clarify lack of inherency of covalent bonding, Applicants have amended claim 41 to recite that the composite material is made by steps (a)-(c) of withdrawn claim 51. The structural limitation of "wherein the fiber reinforcement material is silane-functionalized with the organosilane species" occurs through forming involving the two steps (b) and (c) in sequence. Applicants note that steps (b) and (c) contrasts with the one step process taught by the combination of Ton-That and Flautt. Ton-That in view of Flautt teaches combining silane resized fibers, silane-functionalized carbon nanotubes and epoxy together. In such a process, one of ordinary skill in the art would expect that the respective silanes each bond to the epoxy resin, which as noted above, contrasts with an organosilane species that functionalizes both the carbon nanotubes and the fiber reinforcement material. For at least this reason, Applicants' amended claim 41 is patentable over Ton-That in view of Flautt.

## **II. Amended Claim 68**

The Examiner has stated that "Absent a showing to the contrary, it is Examiner's position that the article of the applied prior art is identical to or only slightly different than the claimed article."

In response, Applicants have amended claim 68 to recite “wherein the hydroxyl-functionalized carbon nanotubes comprise undestroyed rolled up graphene sheets” and the recite “catalytically reacting”. As described in Applicants’ specification at paragraph [0053], one of ordinary skill in the art at the time of the invention would not have expected the oxidative procedure taught by Velasco-Santos to preserve the graphene sheet. In contrast, Applicants’ hydroxy-functionalization process recited in claim 68 preserves the graphene sheet. This permits the superior mechanical properties reported in Example 4 of Applicants’ specification. In particular see the last three sentences of paragraph [0110]. For at least these reasons, Applicants respectfully assert that amended claim 68 is patentable over Ton-That in view of Flautt and further in view of Velasco-Santos.

### **III. Claims 74 and 75**

Claims 74, dependent on claim 68, and 75, dependent on claim 41, have been added to clarify two alternate embodiments of the adding in combination with respect structural limitations. respectfully assert that Applicants respectfully assert that claims 74 and 75 are patentable.

### **IV. Rejoinder**

It is noted that claim 41 has been amended to recite that the composite material is made by steps (a)-(c), which are identical to steps (a)-(c) of claim 50. Applicants respectfully request consideration of rejoinder of withdrawn independent claim 50 and withdrawn dependent claims 51-53 and 55-67 and 71-72.

### **CONCLUSIONS**

Claims 41, 43, 45 – 49, 68 , 69, 74, and 75 are presently pending in the application. Applicants respectfully submit that claims 41, 43, 45 – 49, 68 and 69, as these claims presently stand amended, are in a condition for allowance based on the remarks presented hereinabove. Furthermore, Applicants respectfully request that withdrawn method claims 50 – 53, 55 – 67, 71 and 72 be considered for rejoinder upon allowance of claims 41, 43, 45 – 49, 68 and 69, as required in MPEP 821.04.

The Director is hereby authorized to charge any fees or credit any overpayment due to Deposit Account Number 23-2426 of Winstead PC (referencing matter number 11321-P074WOUS).

If the Examiner has any questions or comments concerning this paper or the present application in general, the Examiner is invited to call the undersigned at (713) 650-2795.

Respectfully submitted,

WINSTEAD PC

Agents for Applicant

WINSTEAD P.C.  
P. O. Box 50784  
Dallas, Texas 75201  
Tel: 713.650.2795  
Fax: 214.745.5390

By: /Farhang Amini/  
Farhang Amini, Ph.D.  
Reg. No. 59,412